The National Institutes of Health | Division of Technical Resources | Office of Research Facilities

Design Requirements Manual **News to Use**

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The formulae $\frac{\partial \rho U_i}{\partial t}+\frac{\partial}{\partial x_j}(\rho U U_j)=-\frac{\partial P}{\partial x_i}+\frac{\partial}{\partial x_j}\left(\mu\frac{\partial U_i}{\partial x_j}\right)+g_i(\rho-\rho_0)$ for building $\frac{\partial}{\partial x_j}(\rho\overline{U}\overline{U_j})=-\frac{\partial \overline{P}}{\partial x_i}+\frac{\partial}{\partial x_j}\left(\mu\frac{\partial \overline{U_i}}{\partial x_j}-\rho\overline{u_i'u_j'}\right)+g_i(\rho-\rho_0)$ state of the art $\frac{\partial}{\partial x_i}(\rho\overline{U}\overline{H})=\frac{\partial}{\partial x_i}\left(\lambda\frac{\partial \overline{T}}{\partial x_i}-\rho\overline{u_i'h'}\right)$ biomedical research facilities.

Room Data Sheets: DRM Appendix F

During the programming and design development phases of any project it is essential to understand and document the functional requirements, features, and elements in every laboratory room. This information must be compiled by the architects and engineers (A/Es) through interviews with the users, surveys of the users' existing facilities, and experience with other laboratories with similar functions. The goal is to establish all of the salient parameters so that a safe and efficient laboratory can be designed.

The definition and compilation of requirements is the foundation of the Basis of Design (BOD), which is required for every project (see DRM Appendix E, A/E Submission Requirements). One key component of the BOD is the Room Data Sheet. Room Data Sheets are provided for a number of typical laboratory room types in Appendix F of the DRM.

Purpose

Room Data Sheets serve many purposes, including:

- Establishing a record of what has been requested by the users, and serving as a sign-off that all of the users' requirements have been accurately recorded.
- Defining functional requirements for reference action by multiple design disciplines throughout the design process.
- Documenting important aspects of the room for review by Division of Occupational Health & Safety (DOHS), Division of Physical Security Management (DPSM), Division of Technical Resources (DTR) and other applicable stakeholders as outlined in Chapter 2 of the DRM.

Process

The programming process must begin with an understanding of the workflow and processes of the lab, and any associated risks and hazards. Laboratory rooms are highly specialized by their nature and must be individually planned by A/Es experienced with laboratory design. Planning should be in consultation with staff familiar with the room's intended use, as well as all applicable stakeholders. Planning should strike the appropriate balance between flexibility and economy, should address the comfort and safety of room and building users, the performance of current and anticipated scientific procedures, and the efficient utilization of space and resources.

Once they have been determined, the physical and programmatic requirements of the rooms must be recorded in Room Data Sheets. Important aspects to be recorded, including but not limited to:

- Optimal requirements needed for the lab to function, including dimensions and basic environmental and utility needs. Also included are minimum DRM-mandated requirements for any lab, including accessibility, door size, ceiling height, handwashing sink, eye wash, flammable storage cabinet, and storage and equipment space.
- Safety and risk assessment of the lab. This will be done in conjunction with the lab users, DOHS, DPSM and other stakeholders, based on the procedures performed and the agents used in the lab. The assessment will determine the BSL level of the lab and the number and types of safety and containment devices, including but not limited to chemical fume hoods, biological safety cabinets, chemical storage and safety showers. Other requirements may include physical security devices, vestibules, and engineering systems.
- Whether the space is normally occupied, and by how many people. Appropriate workstations must be provided for occupants.
- Adjacency, proximity, or connectivity to labs or other functions within the building.
- Finishes, including floor, wall, ceiling, casework, and benchtops. These should address moisture, chemical wash-down, high traffic and other unusual conditions.
- Sensitivity to outside disturbances (e.g. noise, vibration, radio frequency radiation) and the need for remediation (e.g. shielding, vibration isolation).
- Environmental requirements, including temperature, humidity, air exchange rates, relative room pressurization, filtering and air quality.
- Services to be provided, including piped services (compressed air, vacuum, gasses), water (pure, domestic, lab).
- Equipment, including physical dimensions, installation and mounting (floor mounted or benchtop, loose or fixed), power and utility needs, and heat output. For large or equipment-intensive projects an Equipment Schedules should be used. See DRM Appendix G for sample Equipment Schedule.

DRM Appendix F

Appendix F provides 15 sample Room Data Sheets for common laboratory room types in BSL-2, BSL-3, ARF and other common facility types. The Room Data Sheets provided are not intended to be comprehensive and using them is not a substitution for a thorough programming process. These sheets are intended be used as a preliminary basis, and must be edited appropriately.

The forms provided in Appendix F are examples of Room Data Sheets with a level of information appropriate for many projects. Depending on the complexity of the project the A/E may determine that forms with greater or lesser level of detail are appropriate, and the A/E may have a different format or layout that they prefer to use.

'Design Requirements Manual (DRM) News to Use' is a monthly ORF publication featuring salient technical information that should be applied to the design of NIH biomedical research laboratories and animal facilities. NIH Project Officers, A/E's and other consultants to the NIH, who develop intramural, extramural and American Recovery and Reinvestment Act (ARRA) projects will benefit from 'News to Use'. **Please address questions or comments to:** shawm@mail.nih.gov

Further details on this month's topic are available on the DRM website
https://www.orf.od.nih.gov/PoliciesAndGuidelines/BiomedicalandAnimalResearchFacilitiesDesignPoliciesandGuidelines/Pages/DesignRequirementsManual2016
DRM Appendix F